

Prospects for designing waste water treatment structures in small population units

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ABSTRACT

This article talks about the prospects for the design of structures intended for use in small settlements. The issues of installation and stage-by-stage use of structures under operating conditions are considered.

Key words: Septic tank, purification, anaerobic, aerobic, functional chamber.

1. Introduction.

In small settlements, it is important to provide the population with clean drinking water, as well as the removal or treatment of wastewater. Today every homeowner wants to live comfortably, to have a bathroom, hot water, sauna or pool. Therefore, it is not enough just to supply water to it, it is necessary to properly dispose and purify wastewater.

What you need to pay attention to when designing a sewerage system on a site. The design of a regional sewerage system requires careful preparation. It is necessary to know the design means and types of treatment facilities and make the right decision. If the process of designing and regulating sewerage systems is carried out only once, it must be borne in mind that the cost at the time of choice may exceed whether these structures will serve for many years.

Thus, the factors influencing the choice of wastewater treatment plants are considered.

1. The number of population, the number of visitors - all this primarily affects the use of plumbing.

2. Equipment discharge: this is a short-term discharge of wastewater into the wastewater treatment system with a sharp increase in the consumption and concentration of pollutants, or in other words, the highest flow in the treatment system. The more plumbing equipment is involved at the same time, the more wastewater is discharged. Today, the construction of modern treatment facilities is characterized by the presence of several functional chambers. Snow, rainwater, groundwater, normally treated wastewater and the discharge of post-treatment water into water bodies do not lead to a violation of water quality standards in the controlled area or in the place of water use.

3. The capacity of the treatment plant: their production capacity must meet the treatment standards, the wastewater treatment must correspond to the hydraulic power consumption. It is usually given in cubic meters or liters per day.

4. Material from which the cleaning system is made (polypropylene, polyethylene, fiberglass, concrete, metal, etc.). The nature and quality of the material directly affects the installation, operation and maintenance of the system.

5. Wastewater treatment plants of the new generation are equipped with pumps, compressors and ventilation devices, liquid level sensors, an electronic control unit and an alarm system that require connection to a permanent power grid.

6. Features of the relief: the presence and direction of slopes, the proximity of reservoirs, roadside pits, drainage wells, water supply points.

7. The area of the site allocated for the installation of treatment facilities. It is very important to correctly determine the installation location, including inlets, outlets and filtration zones. If the treatment plant is properly designed, the filtration area should be at least 30 meters from the water source.

2. Main part.

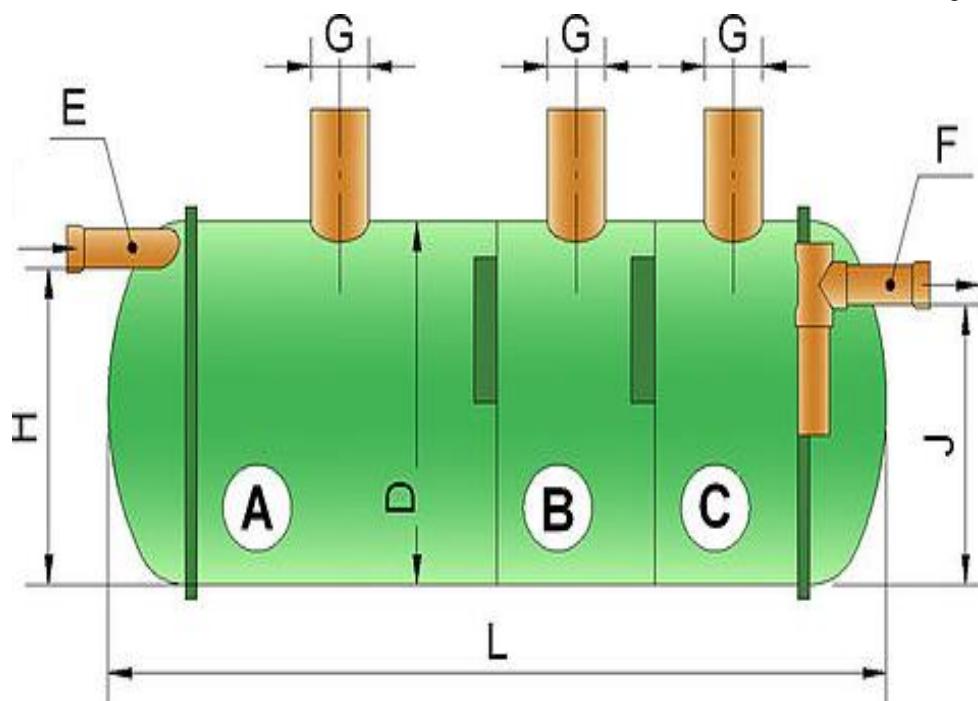
Considering the above factors, the population can choose the type of treatment facilities.

For the population of small areas, it is necessary to choose inexpensive and modern types of treatment facilities. Therefore, we are considering a modern type of treatment process: one of these types is a septic tank - it is designed to receive wastewater, replenish sludge with anaerobic digestion and additional treatment, depending on the type.

There are two main types of septic tanks:

Plastic container: This type of construction is very simple and consists of a sealed tank buried in the ground and a sewer pipe connected to it. Such a septic tank is notable for its low cost and energy efficiency, since no electrical equipment is required for operation. This project has several disadvantages, the disadvantage of which is the need for a constant pump and the installation of special equipment. It depends on the size of the drain and the flow rate of the waste water. It should be noted that the design is not suitable for installation on all types of soil. As a consequence, construction savings increase the cost of wastewater treatment for the population.

Figure 1: Plastic container



Septic tanks for soil treatment: Additional filtration treatment also includes elements of the drainage system in the structural elements of drainage systems. In such systems, wastewater is treated in two stages.

At the first stage: Wastewater enters the tank through pipelines, where large fractions are deposited in the form of sediment, which is then discharged through septic tanks. This method is called sewage swimming. Here, the fermentation of wastewater particles occurs under the action of anaerobic bacteria. The liquid is purified from the reservoir, but not purified (the degree of purification does not exceed 30-40%). Such water cannot be dumped into the ground according to the SanPIN standards. The reservoir must be periodically cleaned from deposits and dirt accumulated on the bottom.

At the second stage: Wastewater that has undergone primary treatment in a septic tank enters the filtration zone. To form a filtration zone, the soil is cleaned, covered with sand, and perforated pipes are laid. Here, treated wastewater is mechanically filtered and absorbed into the soil. At the second stage, the degree of purification is 60%. In five years, it will be necessary to reconstruct the filtration section.

The main advantage is the simplicity of the project, the low cost of materials and a sufficient source of energy. Projects of this type include Eurolos ECO, Triton-ED, Triton-Mini and Triton-T.

Deep biological treatment facilities (DBTF)



3. Material method.

The most modern and technologically advanced type of wastewater treatmentsystem for small areas is vertical biological treatment plants made of polypropylene with functional chambers. Such devices are implemented through a multistage wastewater treatment method based on the interaction of organic pollutants and aerobic bacteria in an environment that is actively oxygenated from the air with the help of aeration. Cameras play an important role in the wastewater treatment process. In the first receiving chamber, wastewater is separated into fractions, and large and heavily contaminated particles settle to the bottom.

At the next stage, it is transferred from the receiving chamber to the next chamber by means of a pump or by means of oxygen-enriched air as a result of bubble ventilation (230 W / mK). In this very chamber, decomposition and mineralization of organic substances occurs in the presence of aerobic microorganisms. It is the heart of the biological wastewater treatment system.

In a chamber called a pyramid, the activated sludge that is recirculated during the secondary treatment settles and the impurities are removed as oil and returned to the aeration tank for further treatment.

In the fourth section, colorless and odorless purified water is drained through pipes using a pump or by gravity. Moreover, the degree of wastewater treatment can reach 98-100%. Such structures can be installed anywhere, for example, in projects such as Eurolos BIO, Diamant, Eco-Grand. These treatment plants operate normally only when the ventilation elements and compressor membranes are replaced. I believe that installing a deep biological treatment plant in rural areas is an easier and more environmentally friendly way to treat wastewater and waste disposal than other options.



The design of treatment facilities for small settlements (septic tank) is considered cheap and convenient, depending on the equipment and technological features.

4. Conclusion.

When choosing a treatment plant for small settlements, it is necessary to choose inexpensive and modern types. Therefore, we need to consider the modern type of cleaning. One of these types is a septic tank, which is designed to receive wastewater, replenish sludge with anaerobic treatment and provide additional treatment, depending on the type. Structure with one or more chambers.

I believe that installing a deep biological treatment plant in rural areas is an easier and more environmentally friendly way to treat wastewater and waste disposal than other options.

Designing treatment facilities for small settlements (septic tanks) is cheap and convenient, depending on the equipment and technological features.

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